DRINKING WATER SURVEILLANCE PROGRAM

WALLACEBURG WATER TREATMENT PLANT

ANNUAL REPORT 1990

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WALLACEBURG
WATER TREATMENT PLANT

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

WALLACEBURG WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Wallaceburg water treatment plant is a conventional treatment plant which treats water from the St. Clair River via the Chenal Ecarte. The process consists of coagulation, flocculation, sedimentation, filtration, taste and odour control and disinfection. This plant has a rated capacity of 11.8 x 1000 m^3/day. The Wallaceburg water treatment plant serves a population of approximately 11,300.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Wallaceburg water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIVE
BACTERIOLOGICAL	21	20	95	7	0	0	5	1	20	5	1	20
CHEMISTRY (FLD)	21	21	100	42	42	100	72	72	100	72	72	100
CHEMISTRY (LAB)	154	127	82	149	102	68	220	197	89	221	190	85
METALS	168	51	30	168	45	26	276	119	43	253	101	39
CHLOROAROMATICS	98	0	0	98	0	0	84	0	0	84	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
PAH	83	0	0	117	0	0	.	.	.	.	.	.
PESTICIDES & PCB	237	1	0	237	0	0	127	0	0	127	0	0
PHENOLICS	7	1	14	7	2	28	.	.	.	.	.	.
SPECIFIC PESTICIDES	47	0	0	59	0	0	6	0	0	6	0	0
VOLATILES	174	0	0	203	27	13	174	24	13	174	24	13
TOTAL	1022	221		1099	218		964	413		942	388	

DRINKING WATER SURVEILLANCE PROGRAM

WALLACEBURG WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Wallaceburg water treatment plant in the summer of 1985 as part of a survey of the St. Clair/Detroit River area. Previous DWSP annual reports have been published for 1986, 1987, 1988 and 1989.

PLANT DESCRIPTION

The Wallaceburg water treatment plant is a conventional treatment plant which treats water from the St. Clair River via the Chenal Ecarte. The process consists of coagulation, flocculation, sedimentation, filtration taste and odour control and disinfection. Chlorine dioxide is generated as part of the disinfection process and powder activated carbon is added on a continuous basis. This plant has a rated capacity of 11.8 x 1000 m^3/day. The Wallaceburg water treatment plant serves a population of approximately 11,300.

The sample day flows ranged from 7.5 x 1000 m^3/day to 9.6 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service

connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the

level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance

organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 6 of 19 treated and distributed water samples with a maximum reported value of 23.0°C.

CHEMISTRY (LAB)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 HZU in 2 of 18 treated and distributed water samples with a maximum reported value of 9.5 HZU.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 15 of 18 treated and distributed water samples with a maximum reported value of 176.0 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 1 of 17 treated and distributed water samples with a maximum reported value of 110.0 ug/L.

Iron exceeded the ODWO Maximum Desirable Concentration of 300 ug/L in 4 of 17 treated and distributed samples with a maximum reported value of 400.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 13 treated and distributed water samples analyzed. The maximum observed level was 40.6 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Wallaceburg water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220003341
PLANT NAME: WALLACEBURG WTP

DISTRICT: SARNIA
REGION: SOUTHWEST
DISTRICT OFFICER :O. WIGLE

UTM #: 173833904713920

PLANT SUPERINTENDENT: LEO DENYS

ADDRESS: LIBBY ROAD
WALLACEBURG, ONTARIO

(519 627 4191)

MUNICIPALITY: WALLACEBURG
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	5.817	(X 1000 M3)
DESIGN CAPACITY:	13.500	(X 1000 M3/DAY)
RATED CAPACITY:	11.820	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
WALLACEBURG	11,295

FIGURE 1

WALLACEBURG WTP

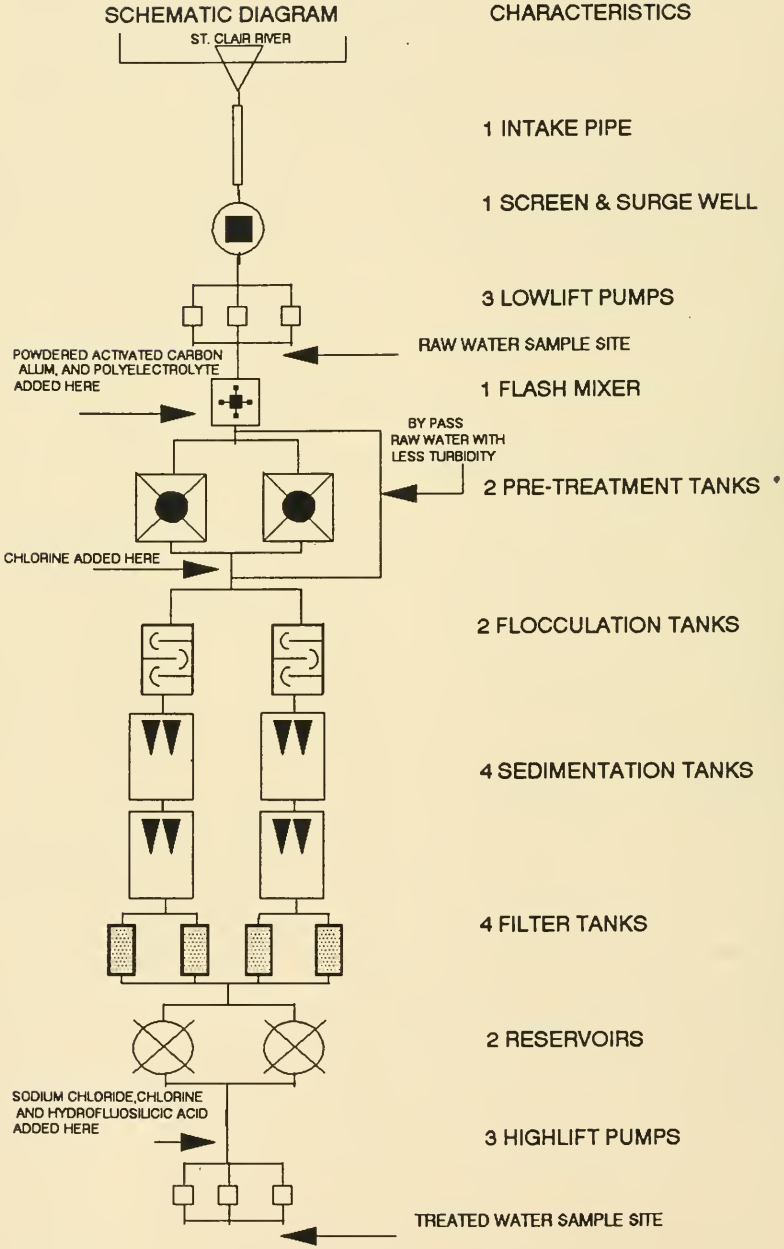

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	TREATED WATER	HOURLY READING
FLUORIDE	TREATED WATER	HOURLY
TEMPERATURE	TREATED WATER	HOURLY READING
TURBIDITY	RAW WATER	HOURLY READING
	TREATED WATER	HOURLY READING

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)					
			PRE CHLORINATION	COAGULATION	TASTE & ODOUR	POST CHLORINATION	COAGULATION AID	FLUORIDATION
			CHLORINE	ALUM LIQUID	ACTIVATED CARBON POW	SODIUM CHLORITE	POLYELECTROLYTE	HYDROFLUOSILICIC ACI
TE	DELAY * TIME(HRS)	FLOW (1000M3)						
AN 04	13.00	9.066	1.05	15.00	5.00	.38		1.20
AN 17	.57	7.564	2.02	15.00	3.00	.29		1.02
AR 14	13.00	9.066	1.02	100.00	5.00	.38	.50	1.20
AY 16	13.00	9.682	.94	15.00	5.00	.38		1.20
UL 11	13.00	9.682	.94	15.00	5.00	.38		1.20
EP 12	.00	.000	1.00	15.00	5.00	.38		1.20
OV 15	13.00	9.682	1.00	15.00	5.00	.38		1.20

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	7	6	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	7	0	0	5	1	0	5	1	0
TOTAL COLIFORM MF	7	7	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	7	7	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	21	20	0	7	0	0	5	1	0	5	1	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	7	7	0	12	12	0	12	12	0
FLD CHLORINE FREE	.	.	.	7	7	0	12	12	0	12	12	0
FLD CHLORINE (TOTAL)	.	.	.	7	7	0	12	12	0	12	12	0
FLD PH	7	7	0	7	7	0	12	12	0	12	12	0
FLD TEMPERATURE	7	7	0	7	7	0	12	12	0	12	12	0
FLD TURBIDITY	7	7	0	7	7	0	12	12	0	12	12	0
*TOTAL SCAN CHEMISTRY (FLD)	21	21	0	42	42	0	72	72	0	72	72	0
CHEMISTRY (LAB)												
ALKALINITY	7	7	0	7	7	0	12	12	0	12	12	0
CALCIUM	7	7	0	7	7	0	12	12	0	12	12	0
CYANIDE	7	0	0	7	0	0	.	.	.	.	.	.
CHLORIDE	7	7	0	7	7	0	12	12	0	12	12	0
COLOUR	7	2	5	7	1	4	12	12	0	12	6	6
CONDUCTIVITY	7	7	0	7	7	0	12	12	0	12	12	0
DISS ORG CARBON	7	7	0	7	7	0	12	12	0	12	12	0
FLUORIDE	7	7	0	7	7	0	12	12	0	12	12	0
HARDNESS	7	7	0	7	7	0	12	12	0	12	12	0
IONCAL	7	7	0	7	7	0	12	12	0	12	12	0
LANGELIERS INDEX	7	7	0	2	2	0	4	4	0	5	5	0
MAGNESIUM	7	7	0	7	7	0	12	12	0	12	12	0
SODIUM	7	7	0	7	7	0	12	12	0	12	12	0
AMMONIUM TOTAL	7	4	2	7	0	1	12	2	4	12	2	4
NITRITE	7	5	2	7	0	5	12	2	9	12	2	10
TOTAL NITRATES	7	7	0	7	7	0	12	12	0	12	12	0
NITROGEN TOT KJELD	7	7	0	7	2	5	12	9	1	12	7	3
PH	7	7	0	7	7	0	12	12	0	12	12	0
PHOSPHORUS FIL REACT	7	1	4	7	0	4	.	.	.	.	.	.
PHOSPHORUS TOTAL	7	3	3	7	0	5	.	.	.	.	.	.
SULPHATE	7	7	0	7	7	0	12	12	0	12	12	0
TURBIDITY	7	7	0	7	6	1	12	12	0	12	12	0
*TOTAL SCAN CHEMISTRY (LAB)	154	127	16	149	102	25	220	197	14	221	190	23

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	7	0	0	7	0	1	12	0	2	11	0	0
ALUMINUM	7	7	0	7	7	0	12	12	0	11	11	0
ARSENIC	7	0	7	7	0	6	12	0	12	11	0	9
BARIUM	7	7	0	7	7	0	12	12	0	11	11	0
BORON	7	2	5	7	2	5	12	7	5	11	6	5
BERYLLIUM	7	0	2	7	0	2	12	0	2	11	0	2
CADMIUM	7	0	2	7	0	0	12	1	4	11	0	2
COBALT	7	1	6	7	0	7	12	0	10	11	0	9
CHROMIUM	7	0	4	7	0	3	12	0	8	11	0	7
COPPER	7	1	6	7	0	7	12	8	4	11	11	0
IRON	7	4	3	7	0	4	12	12	0	11	6	5
MERCURY	7	0	2	7	0	2	.	.	.	.	.	.
MANGANESE	7	7	0	7	1	6	12	12	0	11	11	0
MOLYBDENUM	7	1	6	7	5	2	12	6	6	11	4	7
NICKEL	7	1	5	7	0	3	12	5	3	11	0	6
LEAD	7	2	5	7	0	7	12	6	6	11	5	6
ANTIMONY	7	0	7	7	2	5	12	5	7	11	6	5
SELENIUM	7	0	1	7	0	1	12	0	4	11	0	5
STRONTIUM	7	7	0	7	7	0	12	12	0	11	11	0
TITANIUM	7	3	4	7	2	5	12	4	8	11	5	6
THALLIUM	7	0	0	7	0	1	12	0	1	11	0	0
URANIUM	7	1	6	7	0	5	12	0	8	11	0	3
VANADIUM	7	1	6	7	5	2	12	8	4	11	4	7
ZINC	7	6	1	7	7	0	12	9	3	11	10	1
*TOTAL SCAN METALS	168	51	78	168	45	74	276	119	97	253	101	85
*TOTAL GROUP INORGANIC & PHYSICAL	343	199	94	359	189	99	568	388	111	546	363	108
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	7	0	0	7	0	0	6	0	0	6	0	0
123 TRICHLOROBENZENE	7	0	0	7	0	0	6	0	0	6	0	0
1234 T-CHLOROBENZENE	7	0	0	7	0	0	6	0	0	6	0	0
1235 T-CHLOROBENZENE	7	0	0	7	0	0	6	0	0	6	0	0
124 TRICHLOROBENZENE	7	0	0	7	0	0	6	0	0	6	0	0
1245 T-CHLOROBENZENE	7	0	0	7	0	0	6	0	0	6	0	0
135 TRICHLOROBENZENE	7	0	0	7	0	0	6	0	0	6	0	0
HCB	7	0	0	7	0	0	6	0	0	6	0	0
HEXACHLOROETHANE	7	0	0	7	0	1	6	0	0	6	0	1
OCTACHLOROSTYRENE	7	0	0	7	0	0	6	0	0	6	0	0
PENTACHLOROBENZENE	7	0	0	7	0	0	6	0	0	6	0	0
236 TRICHLOROTOLUENE	7	0	0	7	0	0	6	0	0	6	0	0
245 TRICHLOROTOLUENE	7	0	0	7	0	0	6	0	0	6	0	0
26A TRICHLOROTOLUENE	7	0	0	7	0	0	6	0	0	6	0	0
*TOTAL SCAN CHLOROAROMATICS	98	0	0	98	0	1	84	0	0	84	0	1
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	4	0	0	6	0	0	.	.	.	.	.	.
ANTHRACENE	4	0	0	6	0	0	.	.	.	.	.	.
FLUORANTHENE	5	0	0	7	0	0	.	.	.	.	.	.
PYRENE	5	0	0	7	0	0	.	.	.	.	.	.
BENZO(A)ANTHRACENE	5	0	0	7	0	0	.	.	.	.	.	.
CHRYSENE	5	0	0	7	0	0	.	.	.	.	.	.
DIMETH. BENZ(A)ANTHR	5	0	0	7	0	0	.	.	.	.	.	.
BENZO(E) PYRENE	5	0	0	7	0	0	.	.	.	.	.	.
BENZO(B) FLUORANTHEN	5	0	0	7	0	0	.	.	.	.	.	.
PERYLENE	5	0	0	7	0	0	.	.	.	.	.	.
BENZO(K) FLUORANTHEN	5	0	0	7	0	0	.	.	.	.	.	.
BENZO(A) PYRENE	5	0	0	7	0	0	.	.	.	.	.	.
BENZO(G,H,I) PERYLEN	5	0	0	7	0	0	.	.	.	.	.	.
DIBENZO(A,H) ANTHRAC	5	0	0	7	0	0	.	.	.	.	.	.
INDENO(1,2,3-C,D) PY	5	0	0	7	0	0	.	.	.	.	.	.
BENZO(B) CHRYSENE	5	0	0	7	0	0	.	.	.	.	.	.
CORONENE	5	0	0	7	0	0	.	.	.	.	.	.
*TOTAL SCAN PAH	83	0	0	117	0	0	0	0	0	0	0	0
PESTICIDES & PCB												
ALDRIN	7	0	0	7	0	0	6	0	0	6	0	0
ALPHA BHC	7	0	6	7	0	0	6	0	1	6	0	0
BETA BHC	7	0	0	7	0	0	6	0	0	6	0	0
LINDANE	7	0	0	7	0	0	6	0	0	6	0	0
ALPHA CHLORDANE	7	0	0	7	0	0	6	0	0	6	0	0
GAMMA CHLORDANE	7	0	0	7	0	0	6	0	0	6	0	0
DIELDRIN	7	0	0	7	0	0	6	0	0	6	0	0
METHOXYCHLOR	7	0	0	7	0	0	6	0	0	6	0	0
ENDOSULFAN 1	7	0	0	7	0	0	6	0	0	6	0	0
ENDOSULFAN II	7	0	0	7	0	0	6	0	0	6	0	0
ENDRIN	7	0	0	7	0	0	6	0	0	6	0	0
ENDOSULFAN SULPHATE	7	0	0	7	0	0	6	0	0	6	0	0
HEPTACHLOR EPOXIDE	7	0	0	7	0	0	6	0	0	6	0	0
HEPTACHLOR	7	0	0	7	0	0	6	0	0	6	0	0
MIREX	7	0	0	7	0	0	6	0	0	6	0	0
OXYCHLORDANE	7	0	0	7	0	0	6	0	0	6	0	0
OPODT	7	0	0	7	0	0	6	0	0	6	0	0
PCB	7	0	0	7	0	0	6	0	0	6	0	0
DDD	7	0	0	7	0	0	6	0	0	6	0	0
PPODE	7	0	0	7	0	0	6	0	0	6	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	7	0	0	7	0	0	6	0	0	6	0	0
AMETRINE	7	0	0	7	0	0	.	.	.	.	.	.
ATRAZINE	7	1	0	7	0	1	.	.	.	.	.	.
ATRATONE	7	0	0	7	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	7	0	0	7	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	7	0	1	7	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETONE	7	0	0	7	0	0	.	.	.	.	.	.
PROPAZINE	7	0	0	7	0	0	.	.	.	.	.	.
PROMETRYNE	7	0	0	7	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	6	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	7	0	1	7	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	7	0	0	7	0	0	.	.	.	.	.	.
METOLACHLOR	7	0	0	7	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	1	0	0	1	0	0	1	0	0	1	0	0
*TOTAL SCAN PESTICIDES & PCB	237	1	8	237	0	1	127	0	1	127	0	0
PHENOLICS												
PHENOLICS	7	1	1	7	2	0	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	7	1	1	7	2	0	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	7	0	0	7	0	0	6	0	0	6	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	1	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	1	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	1	0	0	2	0	0	.	.	.	.	.	.
ETHION	1	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	1	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	1	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	1	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	1	0	0	2	0	0	.	.	.	.	.	.
PARATHION	1	0	0	2	0	0	.	.	.	.	.	.
PHORATE	1	0	0	2	0	0	.	.	.	.	.	.
RELDAN	1	0	0	2	0	0	.	.	.	.	.	.
RONNEL	1	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	47	0	0	59	0	0	6	0	0	6	0	0
VOLATILES												
BENZENE	6	0	1	7	0	3	6	0	3	6	0	2
TOLUENE	6	0	1	7	0	1	6	0	2	6	0	2
ETHYLBENZENE	6	0	2	7	0	3	6	0	6	6	0	1
P-XYLENE	6	0	0	7	0	0	6	0	0	6	0	0
M-XYLENE	6	0	1	7	0	0	6	0	0	6	0	0
O-XYLENE	6	0	0	7	0	0	6	0	1	6	0	0
STYRENE	6	0	1	7	0	2	6	0	5	6	0	3
1,1 DICHLOROETHYLENE	6	0	0	7	0	0	6	0	0	6	0	0
METHYLENE CHLORIDE	6	0	0	7	0	0	6	0	0	6	0	0
T1,2DICHLOROETHYLENE	6	0	0	7	0	0	6	0	0	6	0	0
1,1 DICHLOROETHANE	6	0	0	7	0	0	6	0	0	6	0	0
CHLOROFORM	6	0	0	7	7	0	6	6	0	6	6	0
111, TRICHLOROETHANE	6	0	2	7	0	1	6	0	2	6	0	2
1,2 DICHLOROETHANE	6	0	0	7	0	0	6	0	0	6	0	0
CARBON TETRACHLORIDE	6	0	0	7	0	0	6	0	0	6	0	0
1,2 DICHLOROPROPANE	6	0	0	7	0	0	6	0	0	6	0	0
TRICHLOROETHYLENE	6	0	0	7	0	0	6	0	0	6	0	0
DICHLOROBROMOMETHANE	6	0	0	7	7	0	6	6	0	6	6	0
112 TRICHLOROETHANE	6	0	0	7	0	0	6	0	0	6	0	0
CHLORODIBROMOMETHANE	6	0	0	7	6	0	6	6	0	6	6	0
T-CHLOROETHYLENE	6	0	2	7	0	0	6	0	1	6	0	0
BROMOFORM	6	0	0	7	0	4	6	0	5	6	0	6
1122 T-CHLOROETHANE	6	0	0	7	0	0	6	0	0	6	0	0
CHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
1,4 DICHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
1,3 DICHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
1,2 DICHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
ETHLYENE DIBROMIDE	6	0	0	7	0	0	6	0	0	6	0	0
TOTL TRIHALOMETHANES	6	0	0	7	7	0	6	6	0	6	6	0
*TOTAL SCAN VOLATILES	174	0	10	203	27	14	174	24	25	174	24	16
*TOTAL GROUP ORGANIC	658	2	19	733	29	16	391	24	26	391	24	17

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
JAN	128	.	.	.	.	.
MAR	140	.	.	.	.	.
MAY	10 <=>	.	.	.	.	.
JUL	14	.	.	.	.	.
SEP	46	.	.	.	.	.
NOV	76	.	.	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)		
JAN	.	4 <=>	.	.	.	.
MAR	.	4 <=>	.	2 <=>	.	1 <=>
MAY	.	0 <=>	.	44	.	1 <=>
JUL	.	0 <=>	.	0 <=>	.	2 <=>
SEP	.	0 <=>	.	1 <=>	.	20
NOV	.	2 <=>	.	1 <=>	.	8 <=>
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
JAN	2200	.	.	.	.	.
MAR	47000	.	.	.	.	.
MAY	420	.	.	.	.	.
JUL	270	.	.	.	.	.
SEP	440	.	.	.	.	.
NOV	2100	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	9100	.	.	.	.	.
MAR	25000	.	.	.	.	.
MAY	2800	.	.	.	.	.
JUL	6400	.	.	.	.	.
SEP	6800	.	.	.	.	.
NOV	29000	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.	.200	.050	.050	.100	.050
MAR	.	.200	.100	.050	.100	.050
MAY	.	.200	.050	.050	.050	.050
JUL	.	.150	.050	.050	.050	.050
SEP	.	.100	.050	.050	.050	.050
NOV	.	.100	.050	.050	.050	.050
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.	1.000	.100	.300	.100	.200
MAR	.	1.100	.100	.150	.100	.100
MAY	.	.900	.100	.150	.100	.100
JUL	.	.950	.100	.200	.050	.200
SEP	.	1.000	.050	.100	.050	.150
NOV	.	1.000	.100	.150	.100	.100
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.	1.200	.150	.350	.200	.250
MAR	.	1.300	.200	.200	.200	.150
MAY	.	1.100	.150	.200	.150	.150
JUL	.	1.100	.150	.250	.100	.250
SEP	.	1.100	.100	.150	.100	.200
NOV	.	1.100	.150	.200	.150	.150
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
JAN	7.600	7.000	7.200	7.000	7.200	7.000
MAR	7.400	6.800	6.800	6.800	6.800	6.800
MAY	7.600	7.000	7.200	7.200	7.300	7.400
JUL	8.000	7.200	7.000	6.800	7.000	6.800
SEP	7.900	7.400	7.300	7.400	7.400	7.300
NOV	7.400	7.000	7.500	7.300	7.300	7.200
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
JAN	2.000	2.500	12.000	5.000	14.000	7.000
MAR	4.000	4.000	10.000	5.000	13.000	7.000
MAY	8.000	10.000	16.000	13.000	17.000	14.000
JUL	19.000	19.000	20.000	20.000	22.000	21.000
SEP	20.000	21.000	19.000	22.000	22.000	23.000
NOV	10.000	10.000	12.000	14.000	18.000	15.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
JAN	1.600	.170	.900	.990	.550	.800
MAR	210.000	.600	2.100	1.600	1.700	2.700
MAY	3.000	.160	2.000	1.900	1.900	6.500
JUL	5.800	.120	.100	.750	1.000	.800
SEP	3.500	.180	.590	.520	.540	.760
NOV	3.400	.070	.170	1.100	.900	1.600

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
JAN	83.800	71.400	72.400	72.300	73.400	72.900
MAR	101.400	54.900	67.600	58.700	62.800	72.000
MAY	84.100	71.200	72.000	72.400	72.400	72.300
JUL	84.400	73.800	74.700	73.900	73.900	74.700
SEP	84.000	74.200	73.500	74.500	75.000	75.200
NOV	84.100	71.700	74.100	73.300	73.200	74.100
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
JAN	31.400	30.700	31.700	31.800	31.800	30.600
MAR	53.800	52.800	47.800	53.200	55.600	53.600
MAY	29.100	29.700	29.700	30.200	29.500	29.400
JUL	29.400	30.200	30.000	30.200	30.200	30.400
SEP	29.500	29.600	29.800	29.800	31.000	30.600
NOV	27.000	27.000	28.000	27.000	27.400	27.200
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
JAN	11.200	13.200	15.200	13.500	13.800	13.600
MAR	21.200	20.200	18.500	19.300	19.900	19.800
MAY	10.300	12.100	12.700	12.400	12.500	12.300
JUL	8.100	9.400	9.800	9.200	9.400	8.900
SEP	8.200	11.300	11.100	10.900	11.000	10.800
NOV	5.600	6.600	7.900	7.600	7.200	7.400
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
JAN	1.000 <T	BDL	2.500	3.000	1.000 <T	2.500
MAR	43.500	3.500	6.500	8.000	6.000	9.500
MAY	.500 <T	.500 <T	5.000	5.000	3.500	3.500
JUL	1.000 <T	BDL	2.500	2.500	.500 <T	.500 <T
SEP	.500 <T	.500 <T	3.000	2.500	1.000 <T	1.500 <T
NOV	2.500	1.500 <T	15.000	5.000	2.000 <T	3.500
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
JAN	235	242	250	242	246	243
MAR	371	394	351	384	421	388
MAY	233	240	244	244	244	242
JUL	228	235	238	235	235	236
SEP	225	235	236	235	237	236
NOV	220	226	236	232	230	231
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
JAN	1.600	1.200	1.800	1.200	1.700	1.200
MAR	7.500	2.600	2.100	2.300	2.400	2.100
MAY	1.700	1.300	1.300	1.000	1.200	1.000
JUL	2.000	1.600	1.600	1.300	1.300	1.400
SEP	1.500	1.100	1.200	1.000	1.100	.900
NOV	1.500	1.000	1.200	1.000	1.000	.900

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
JAN	.100	.980	.820	.840	.800	.800
MAR	.200	.920	.740	.780	.640	.640
MAY	.100	.980	1.040	1.040	.960	.960
JUL	.100	.880	1.000	.980	1.000	1.020
SEP	.080	.200	1.140	.780	1.160	.820
NOV	.080	1.400	1.300	1.280	1.300	1.300
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
JAN	109.100	108.100	110.200	110.000	110.300	107.400
MAR	180.000	173.000	158.000	172.000	180.000	176.000
MAY	104.100	105.700	106.000	107.200	104.900	104.900
JUL	106.000	107.000	107.000	106.000	108.000	108.000
SEP	105.000	105.200	105.500	105.400	109.200	107.500
NOV	98.000	99.000	102.000	99.000	100.000	99.000
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JAN	5.817	6.706	7.508	7.348	6.173	5.017
MAR	3.026	1.690	3.671	4.085	4.381	3.549
MAY	.409	3.673	1.365	2.571	.905	1.345
JUL	2.337	4.620	3.236	3.425	4.708	4.083
SEP	1.595	.856	2.754	1.910	4.960	2.915
NOV	1.733	2.256	.957	1.033	.723	1.537
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JAN	.266	.004	-.079	.105	-.070	.032
MAR	.309	-.448	-.207	-.545	-.410	-.323
MAY	.176	-.330	.003	-.097	-.078	-.099
JUL	.134	.024	-.024	-.075	.045	.042
SEP	.344	-.062	.056	.043	.072	.008
NOV	.158	-.083	-.027	-.086	-.049	-.088
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 30 (F2)		
JAN	7.500	7.600	7.500	7.450	7.550	7.500
MAR	11.200	10.000	9.300	9.500	10.000	10.200
MAY	7.650	7.650	7.750	7.700	7.600	7.650
JUL	7.800	7.800	7.800	7.600	7.900	7.600
SEP	7.600	7.600	7.550	7.500	7.700	7.550
NOV	7.500	7.700	7.900	7.600	7.700	7.500
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
JAN	7.100	7.500	8.600	7.400	7.300	7.600
MAR	6.400	6.600	7.200	7.000	6.800	7.400
MAY	6.000	6.500	6.500	6.400	6.300	6.300
JUL	5.200	5.400	5.200	4.800	5.000	5.000
SEP	5.100	5.800	5.900	5.700	5.900	5.600
NOV	4.200	4.400	4.600	4.400	4.400	4.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
JAN	.012	BDL	.030	BDL	BDL	BDL
MAR	.080	BDL	.030	.008 <T	.012	.034
MAY	.002 <T	BDL	.006 <T	BDL	.004 <T	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	.002 <T	BDL	BDL	BDL	.002 <T	BDL
NOV	.010	.004 <T	.006 <T	.006 <T	.004 <T	.006 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
JAN	.003 <T	.003 <T	.003 <T	.002 <T	.002 <T	.001 <T
MAR	.130	.004 <T	.010	.006	.012	.012
MAY	.005	BDL	.001 <T	BDL	.001 <T	.001 <T
JUL	.006	.001 <T	.002 <T	.001 <T	.001 <T	.002 <T
SEP	.005	.003 <T	.004 <T	.003 <T	.003 <T	.003 <T
NOV	.005	.002 <T	.001 <T	.004 <T	.002 <T	.002 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
JAN	.330	.330	.340	.315	.305	.315
MAR	5.930	5.160	3.520	5.020	4.940	4.430
MAY	.355	.370	.330	.315	.325	.300
JUL	.300	.315	.300	.305	.300	.305
SEP	.255	.270	.265	.255	.255	.255
NOV	.280	.300	.365	.320	.300	.295
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.180	.140	.310	.110	.250	.120
MAR	1.730	.400	.400	.350	.390	.330
MAY	.130	.070 <T	BDL	BDL	BDL	BDL
JUL	.200	.090 <T	.150	.120	.110	.120
SEP	.140	.060 <T	.120	.060 <T	.110	.060 <T
NOV	.190	.080 <T	.150	.100	.090 <T	.090 <T
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
JAN	8.260	8.080	7.980	8.160	7.980	8.100
MAR	8.020	7.540	7.730	7.410	7.500	7.540
MAY	8.200	7.760	8.090	7.980	8.010	7.990
JUL	8.150	8.090	8.040	7.990	8.110	8.100
SEP	8.360	8.010	8.130	8.110	8.120	8.060
NOV	8.210	8.040	8.070	8.030	8.060	8.020
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
JAN	BDL	BDL	.	.	.	.
MAR	.122	.000 <T	.	.	.	.
MAY	.001 <T	.001 <T	.	.	.	.
JUL	.001 <T	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	.001 <T	.000 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)		
JAN	.007 <T	.002 <T	.	.	.	.
MAR	.398	.004 <T	.	.	.	.
MAY	.008 <T	.004 <T	.	.	.	.
JUL	.014	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	.008 <T	.002 <T	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)		
JAN	16.370	24.190	23.760	24.000	24.020	23.650
MAR	34.940	79.100	58.530	72.940	74.990	66.900
MAY	16.100	24.900	26.360	25.860	25.310	25.220
JUL	16.520	24.730	23.980	24.240	24.170	24.040
SEP	16.940	24.640	23.990	23.650	23.710	23.890
NOV	15.610	23.210	23.810	23.240	23.460	23.440
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)		
JAN	3.100	.480	.540	.560	.410	.610
MAR	200.000 >	.800	1.800	1.400	1.100	2.000
MAY	3.400	.140	2.600	2.900	1.570	2.200
JUL	6.400	.290	.680	.460	.470	.450
SEP	5.300	.320	.700	.450	.290	.650
NOV	4.000	.130 <T	.990	.570	.340	.560

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)		
JAN	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	.070 <T	.060 <T	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	.070 <T	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	!RE
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
JAN	28.000	22.000	55.000	20.000	16.000	15.000
MAR	1600.000	52.000	48.000	63.000	52.000	41.000
MAY	42.000	39.000	66.000	56.000	38.000	42.000
JUL	67.000	88.000	60.000	63.000	44.000	44.000
SEP	48.000	110.000	75.000	89.000	54.000	79.000
NOV	47.000	33.000	38.000	38.000	23.000	!RE
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
JAN	.550 <T	.350 <T	.250 <T	.300 <T	.210 <T	.320 <T
MAR	.850 <T	.300 <T	.320 <T	.490 <T	.340 <T	.280 <T
MAY	.530 <T	.580 <T	.610 <T	.560 <T	.330 <T	.410 <T
JUL	.460 <T	.410 <T	.340 <T	.490 <T	.380 <T	.370 <T
SEP	.260 <T	BDL	.190 <T	.230 <T	BDL	BDL
NOV	.550 <T	.490 <T	.500 <T	.430 <T	.340 <T	!RE
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
JAN	15.000	15.000	16.000	15.000	15.000	14.000
MAR	48.000	27.000	24.000	27.000	30.000	28.000
MAY	14.000	16.000	16.000	16.000	16.000	16.000
JUL	14.000	14.000	14.000	15.000	15.000	15.000
SEP	15.000	16.000	16.000	16.000	16.000	16.000
NOV	14.000	15.000	14.000	14.000	14.000	!RE
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
JAN	15.000 <T	17.000 <T	22.000	17.000 <T	16.000 <T	15.000 <T
MAR	43.000	42.000	40.000	41.000	43.000	41.000
MAY	63.000	85.000	85.000	87.000	81.000	87.000
JUL	14.000 <T	16.000 <T	17.000 <T	16.000 <T	16.000 <T	15.000 <T
SEP	19.000 <T	16.000 <T	28.000	27.000	23.000	26.000
NOV	13.000 <T	16.000 <T	17.000 <T	16.000 <T	16.000 <T	!RE
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)		
JAN	BDL	BDL	BDL	BDL	BDL	BDL
MAR	.320 <T	.070 <T	BDL	BDL	BDL	BDL
MAY	.120 <T	.060 <T	.130 <T	.080 <T	.090 <T	.090 <T
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	!RE

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.070 <T	BDL	BDL	BDL
MAR	.100 <T	BDL	BDL	BDL	BDL	BDL
MAY	.060 <T	BDL	1.200	BDL	BDL	BDL
JUL	BDL	BDL	.090 <T	BDL	BDL	BDL
SEP	BDL	BDL	.070 <T	.060 <T	.080 <T	.060 <T
NOV	BDL	BDL	BDL	BDL	BDL	!RE
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.090 <T	.060 <T	.100 <T	.060 <T	.110 <T	.070 <T
MAR	1.500	.140 <T	.120 <T	.150 <T	.090 <T	.120 <T
MAY	.110 <T	.080 <T	.130 <T	.060 <T	.040 <T	.030 <T
JUL	.170 <T	.080 <T	.090 <T	.100 <T	.070 <T	.110 <T
SEP	.060 <T	.050 <T	BDL	BDL	BDL	BDL
NOV	.170 <T	.130 <T	.150 <T	.150 <T	.150 <T	!RE
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
JAN	BDL	BDL	BDL	BDL	BDL	BDL
MAR	4.700 <T	2.300 <T	2.000 <T	2.200 <T	2.200 <T	2.200 <T
MAY	2.400 <T	3.400 <T	3.200 <T	3.300 <T	3.000 <T	3.200 <T
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	1.600 <T	BDL	1.400 <T	2.000 <T	1.400 <T	1.800 <T
NOV	1.000 <T	.880 <T	1.100 <T	1.100 <T	.770 <T	!RE
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
JAN	2.500 <T	1.500 <T	24.000	4.700 <T	31.000	6.600
MAR	6.800	4.900 <T	35.000	8.800	46.000	13.000
MAY	2.100 <T	2.300 <T	140.000	7.000	31.000	6.800
JUL	2.500 <T	2.000 <T	56.000	3.800 <T	16.000	7.700
SEP	2.700 <T	3.100 <T	73.000	3.500 <T	29.000	12.000
NOV	1.700 <T	1.100 <T	94.000	2.700 <T	30.000	!RE
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
JAN	33.000 <T	BDL	120.000	130.000	41.000 <T	99.000
MAR	1600.000	24.000 <T	300.000	350.000	240.000	400.000
MAY	54.000 <T	BDL	330.000	380.000	280.000	330.000
JUL	110.000	6.100 <T	110.000	93.000	44.000 <T	37.000 <T
SEP	85.000	8.300 <T	150.000	120.000	48.000 <T	100.000
NOV	65.000	6.800 <T	250.000	190.000	53.000 <T	!RE
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)		
JAN	.020 <T	.020 <T	.	.	.	.
MAR	BDL	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
JAN	2.400	.360 <T	9.000	9.000	4.000	11.000
MAR	81.000	11.000	21.000	21.000	19.000	39.000
MAY	3.400	.460 <T	33.000	43.000	17.000	29.000
JUL	6.800	.440 <T	7.300	7.500	4.800	6.900
SEP	3.500	.140 <T	10.000	12.000	11.000	15.000
NOV	2.800	.250 <T	15.000	13.000	12.000	!RE

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.530	.610	.520	.520	.420 <T	.490 <T
MAR	.230 <T	1.700	1.100	1.500	1.100	.930
MAY	.480 <T	.480 <T	.400 <T	.330 <T	.450 <T	.330 <T
JUL	.470 <T	.590	.490 <T	.530	.540	.620
SEP	.460 <T	.530	.530	.390 <T	.410 <T	.430 <T
NOV	.410 <T	.470 <T	.480 <T	.470 <T	.440 <T	!RE
NICKEL (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 350 (D3)		
JAN	.790 <T	.460 <T	3.100	.540 <T	1.100 <T	BDL
MAR	3.500	BDL	5.900	BDL	.240 <T	.410 <T
MAY	.820 <T	BDL	25.000	.260 <T	.460 <T	.220 <T
JUL	.280 <T	.300 <T	3.300	BDL	.640 <T	BDL
SEP	BDL	BDL	3.700	BDL	BDL	BDL
NOV	.540 <T	BDL	1.700 <T	BDL	BDL	!RE
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
JAN	.500 <T	.140 <T	.940	.120 <T	.630	.100 <T
MAR	4.100	.410 <T	.910	.130 <T	1.400	.390 <T
MAY	.490 <T	.190 <T	8.100	.190 <T	1.400	.290 <T
JUL	.680	.280 <T	3.000	.100 <T	.490 <T	.350 <T
SEP	.420 <T	.370 <T	4.200	.140 <T	.820	.430 <T
NOV	.330 <T	.120 <T	2.200	.110 <T	.820	!RE
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
JAN	.400 <T	.310 <T	.410 <T	.410 <T	.420 <T	.530
MAR	.180 <T	.350 <T	.520	.550	.470 <T	.490 <T
MAY	.260 <T	.520	.640	.500 <T	.640	.580
JUL	.480 <T	.480 <T	.440 <T	.490 <T	.570	.390 <T
SEP	.450 <T	.500 <T	.720	.530	.730	.600
NOV	.420 <T	.410 <T	.490 <T	.460 <T	.490 <T	!RE
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
JAN	BDL	1.300 <T	BDL	BDL	BDL	BDL
MAR	1.300 <T	BDL	BDL	1.600 <T	1.200 <T	1.300 <T
MAY	BDL	BDL	2.100 <T	2.600 <T	2.200 <T	1.500 <T
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	1.100 <T	BDL	BDL	1.100 <T
NOV	BDL	BDL	BDL	BDL	BDL	!RE
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
JAN	100.000	100.000	110.000	100.000	100.000	100.000
MAR	150.000	140.000	130.000	140.000	140.000	150.000
MAY	100.000	100.000	110.000	110.000	110.000	110.000
JUL	100.000	100.000	99.000	100.000	110.000	110.000
SEP	110.000	110.000	110.000	110.000	120.000	120.000
NOV	94.000	99.000	98.000	99.000	97.000	!RE

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
JAN	4.200 <T	3.400 <T	3.700 <T	3.400 <T	3.100 <T	3.000 <T
MAR	13.000	7.100	5.700	6.500	7.000	5.700
MAY	6.500	5.200	5.500	5.400	5.200	5.200
JUL	5.800	4.400 <T	4.700 <T	4.400 <T	5.000 <T	5.100
SEP	4.300 <T	2.800 <T	4.200 <T	4.000 <T	4.200 <T	3.500 <T
NOV	3.600 <T	2.900 <T	3.000 <T	2.500 <T	3.100 <T	!RE
THALLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 13 (D4)		
JAN	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	.060 <T	BDL	.070 <T	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	!RE
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
JAN	.300 <T	.080 <T	.070 <T	.090 <T	BDL	BDL
MAR	1.500	.110 <T	.140 <T	.100 <T	.100 <T	.140 <T
MAY	.230 <T	BDL	.070 <T	BDL	BDL	BDL
JUL	.230 <T	.070 <T	BDL	BDL	BDL	BDL
SEP	.210 <T	.080 <T	BDL	.060 <T	BDL	BDL
NOV	.180 <T	BDL	.060 <T	.070 <T	.060 <T	!RE
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.270 <T	.420 <T	.380 <T	.350 <T	.220 <T	.330 <T
MAR	3.100	.640	.520	.560	.470 <T	.550
MAY	.300 <T	.520	.730	.510	.590	.580
JUL	.400 <T	.600	.530	.520	.480 <T	.410 <T
SEP	.330 <T	.580	.510	.480 <T	.380 <T	.510
NOV	.320 <T	.540	.570	.470 <T	.280 <T	!RE
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
JAN	2.300	12.000	17.000	1.800 <T	8.800	2.400
MAR	23.000	10.000	10.000	4.700	12.000	3.400
MAY	3.300	3.700	51.000	3.200	7.300	1.800 <T
JUL	2.600	2.900	31.000	1.500 <T	3.100	2.100
SEP	2.300	5.400	32.000	1.400 <T	7.400	3.700
NOV	2.900	4.100	52.000	2.900	5.100	!RE

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)	
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	8.000 <T	.	BDL	.	9.000 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
JAN	2.000 <T	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	2.000 <T	BDL	.	1.000 <T	.	BDL
JUL	2.000 <T	BDL	.	BDL	.	BDL
SEP	1.000 <T	BDL	.	BDL	.	BDL
NOV	2.000 <T	BDL	.	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)		
JAN	BDL	BDL	.	.	.	.
MAR	510.000	470.000 <T	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DESETHYLATRAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)		
JAN	BDL	BDL	.	.	.	.
MAR	200.000 <T	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
SIMAZINE (NG/L)			DET'N LIMIT = 50.000	GUIDELINE = 10000 (A2)		
JAN	BDL	BDL	.	.	.	.
MAR	80.000 <T	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .200	GUIDELINE = 2 (A4)		
JAN	.600 <T	1.200	.	.	.	.
MAR	2.400	1.000	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	.100 <T	.	.100 <T	.	.050 <T
MAR	BDL	.050 <T	.	.050 <T	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	!U	.050 <T	.	.050 <T	.	.050 <T
NOV	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
JAN	BDL	BDL	.	.050 <T	.	.050 <T
MAR	.050 <T	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	.050 <T	.	.050 <T	.	.050 <T
SEP	!U	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
JAN	BDL	BDL	.	.050 <T	.	BDL
MAR	.100 <T	.100 <T	.	.100 <T	.	BDL
MAY	BDL	.050 <T	.	.050 <T	.	BDL
JUL	BDL	BDL	.	.100 <T	.	BDL
SEP	!U	.100 <T	.	.050 <T	.	.100 <T
NOV	.050 <T	BDL	.	.050 <T	.	BDL
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)		
JAN	BDL	BDL	.	BDL	.	BDL
MAR	.100 <T	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	!U	BDL	.	BOL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JAN	BDL	BDL	.	.050 <T	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	!U	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	BDL	BDL	.	.100 <T	.	BDL
MAR	.100 <T	.100 <T	.	.100 <T	.	.050 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	.150 <T	.	BDL
SEP	!U	BDL	.	.150 <T	.	.150 <T
NOV	BDL	.050 <T	.	.100 <T	.	.100 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	11.100	.	9.400	.	6.800
MAR	BDL	28.700	.	19.400	.	18.200
MAY	BDL	7.200	.	3.100	.	3.600
JUL	BDL	7.400	.	8.900	.	11.600
SEP	!U	11.300	.	10.400	.	12.300
NOV	BDL	11.300	.	5.400	.	6.600
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
JAN	BDL	BDL	.	.060 <T	.	.020 <T
MAR	.100 <T	.040 <T	.	.040 <T	.	.060 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	!U	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
JAN	BDL	6.800	.	7.500	.	6.150
MAR	BDL	10.100	.	8.000	.	9.700
MAY	BDL	8.350	.	5.100	.	5.400
JUL	BDL	7.800	.	8.400	.	8.550
SEP	!U	7.550	.	7.500	.	7.550
NOV	BDL	6.400	.	5.000	.	5.250
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	2.300	.	3.000	.	2.600
MAR	BDL	1.800	.	1.600	.	2.800
MAY	BDL	6.400	.	5.100	.	5.300
JUL	BDL	5.100	.	5.400	.	5.100
SEP	!U	3.700	.	4.200	.	4.200
NOV	BDL	3.200	.	2.600	.	2.500
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)		
JAN	.050 <T	BDL	.	.050 <T	.	BDL
MAR	.100 <T	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	!U	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
BROMOFORM (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)		
JAN	BDL	BDL	.	.600 <T	.	.200 <T
MAR	BDL	BDL	.	BDL	.	.200 <T
MAY	BDL	.800 <T	.	.800 <T	.	.800 <T
JUL	BDL	.600 <T	.	.600 <T	.	.600 <T
SEP	!U	.400 <T	.	.600 <T	.	.600 <T
NOV	BDL	.400 <T	.	.400 <T	.	.400 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALLACEBURG WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
JAN	BDL	20.150	.	20.350	.	15.800
MAR	BDL	40.600	.	29.000	.	30.900
MAY	BDL	22.750	.	14.100	.	15.100
JUL	BDL	20.900	.	23.300	.	25.850
SEP	!U	22.950	.	22.650	.	24.550
NOV	BDL	21.300	.	13.300	.	14.650

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BACTERIOLOGICAL				
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0	(A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML	(A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A	
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML	(A1)
CHEMISTRY (FLD)				
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD PH	DMNSLESS	N/A	6.5-8.5	(A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0	(A3)
FIELD TURBIDITY	FTU	N/A	1.0	(A1)
CHEMISTRY (LAB)				
ALKALINITY	MG/L	0.2	30-500	(A3)
AMMONIUM TOTAL	MG/L	0.002	0.05	(F2)
CALCIUM	MG/L	0.2	100	(F2)
CHLORIDE	MG/L	0.2	250	(A3)
COLOUR	TCU	0.5	5.0	(A3)
CONDUCTIVITY	UMHO/CM	1.0	400	(F2)
CYANIDE	MG/L	0.001	0.2	(A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0	(A3)
FLUORIDE	MG/L	0.01	2.4	(A1)
HARDNESS	MG/L	0.5	80-100	(A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A	
MAGNESIUM	MG/L	0.1	30.0	(F2)
NITRITE	MG/L	0.001	1.0	(A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A	
PH	DMNSLESS	N/A	6.5-8.5	(A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A	
PHOSPHORUS TOTAL	MG/L	0.002	0.4	(F2)
SODIUM	MG/L	0.2	200	(A4)
SULPHATE	MG/L	0.2	500	(A3)
TOTAL NITRATES	MG/L	0.005	10.0	(A1)
TURBIDITY	FTU	0.05	1.0	(A1)
CHLOROAROMATICS				
123 TRICHLOROBENZENE	NG/L	5.0	N/A	
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A	
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A	
124 TRICHLOROBENZENE	NG/L	5.0	10000	(I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000	(D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A	
236 TRICHLOROTOLUENE	NG/L	5.0	N/A	
245 TRICHLOROTOLUENE	NG/L	5.0	N/A	
26A TRICHLOROTOLUENE	NG/L	5.0	N/A	
HEXACHLOROBENZENE	NG/L	1.0	10	(C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450	(D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000	(D4)
HEXACHLOROETHANE	NG/L	1.0	1900	(D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A	
PENTACHLOROBENZENE	NG/L	1.0	74000	(D4)
CHLOROPHENOLS				
234 TRICHLOROPHENOL	NG/L	100.0	N/A	
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A	
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A	

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZD(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS
Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS
Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME
Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION
This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM
Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: P0C0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH)

(**Caution:** NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times

-fill to 2 cm from top

Metals

-500 mL plastic bottle (PET 500)
-rinse bottle and cap three times
-fill to 2 cm from top
-add 10 drops nitric acid (HNO_3)
(**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry

-500 mL plastic bottle (PET 500)
-rinse bottle and cap with sample water three times
-fill to 2 cm from top

Bacteriological

-250 mL plastic bottle with white seal on cap
-do not rinse bottle, preservative has been added
-avoid touching bottle neck or inside of cap
-fill to top of red label as marked

Metals

-500 mL plastic bottle (PET 500)
-rinse bottle and cap three times
-fill to 2 cm from top
-add 10 drops nitric acid HNO_3

(**Caution:** HNO_3 is corrosive)

Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.